

Application No. 10/790,509  
Amendment dated December 11, 2007  
Reply to Final Office Action of October 31, 2007

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**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Currently Amended) A computing device, comprising:
  - a processor;
  - a memory coupled to the processor; and
  - program instructions provided to the memory and executable by the processor

to:

  - track a virtual address space for a process associated with a device connected to the computing device;
  - release a physical address space associated with the virtual address space when the device has a connection removed from the computing device; and
  - register that the virtual address space, previously available to the process, is no longer valid for process use after subsequent to when the physical address space is released and before when the process has released the virtual address space.
2. (Original) The computing device of claim 1, wherein the device includes a device which can be mapped to memory.
3. (Original) The computing device of claim 1, wherein the virtual address space includes an input/output space.

Application No. 10/790,509  
Amendment dated December 11, 2007  
Reply to Final Office Action of October 31, 2007

4. (Original) The computing device of claim 1, wherein the program instructions are part of a memory management system which includes a virtual memory data structure associated with the process.

5. (Original) The computing device of claim 4, wherein the program instructions execute to register the virtual address space is no longer valid for process use in the virtual memory data structure associated with the process.

6. (Original) The computing device of claim 1, wherein the program instructions execute to allocate the virtual address space when the process requests physical memory.

7. (Original) The computing device of claim 1, wherein the program instructions execute to register that the virtual address space is available for use when the process releases the virtual address space.

8. (Currently Amended) A computing device, comprising:  
a processor;  
a random access memory coupled to the processor; and  
program instructions provided to the memory and executable by the processor,  
the program instructions are part of a memory management system to:  
derefence a virtual address space for a process associated with a  
removable memory mappable device connected to the computing device;  
release a physical address space associated with the virtual address space  
when the device associated with the process is logically disconnected; and  
register in a virtual memory data structure of the memory management  
system that the virtual address space is no longer available to the process ~~after~~  
subsequent to when the physical address space is released and before when the process  
has ~~not~~ yet released the virtual address space.

Application No. 10/790,509  
Amendment dated December 11, 2007  
Reply to Final Office Action of October 31, 2007

9. (Previously Presented) The computing device of claim 8, wherein the program instructions execute to unmap the virtual address space in a manner which do not violate semantics for an operating system of the computing device.
10. (Original) The computing device of claim 9, wherein the operating system is selected from the group of a Unix operating system and a Linux operating system.
11. (Original) The computing device of claim 8, wherein the program instructions execute to allow the process to unmap the virtual address space subsequent to the release of the physical address space.
12. (Original) The computing device of claim 8, wherein the program instructions execute to indicate an operation as failed if the process attempts to perform the operation subsequent to registering that the virtual address space is no longer valid for process use.
13. (Previously Presented) A computing device, comprising:
  - a processor;
  - a memory coupled to the processor, the memory including program instructions for maintaining a virtual memory data structure as part of a memory management system; and
  - means for unmapping a virtual address space for a process in a manner which does not violate semantics for an operating system of the computing device when a removable memory mappable device associated with the process is logically disconnected.
14. (Original) The computing device of claim 13, wherein the program instructions execute to dereference the virtual address space for the process.

Application No. 10/790,509  
Amendment dated December 11, 2007  
Reply to Final Office Action of October 31, 2007

15. (Previously Presented) The computing device of claim 13, wherein the means for unmapping the virtual address space includes program instructions which execute to maintain a representation of an object associated with the process in the virtual memory data structure of the process.

16. (Previously Presented) The computing device of claim 15, wherein the means for unmapping the virtual address space includes program instructions which execute to remove a mapping of the object to physical memory.

17. (Currently Amended) The computing device of claim 16, wherein the means for unmapping the virtual address space includes program instructions which execute to register in the virtual memory data structure of the process that the virtual address space associated with the process is not available for use after subsequent to when the mapping of the object to physical memory has been removed.

18. (Previously Presented) The computing device of claim 17, wherein the program instructions execute to set a bit in a preigion of the virtual memory data structure to indicate that the virtual address space is not available for use.

19. (Currently Amended) A method for memory management on a computing device, comprising:

dereferencing a memory address for a process associated with a removable memory mappable device;

mapping a representation of an object associated with the process in a virtual memory data structure associated with the process;

removing the object from physical memory when the device is logically disconnected from the computing device; and

Application No. 10/790,509  
Amendment dated December 11, 2007  
Reply to Final Office Action of October 31, 2007

providing an indication in the virtual memory data structure that a virtual address space is no longer available for use by the process, ~~after removing~~ when the object is removed from physical memory, without removing the representation of the object from the virtual memory data structure.

20. (Original) The method of claim 19, further including unmapping the virtual address space at the request of the process subsequent to the device being logically disconnected from the computing device.

21. (Original) The method of claim 19, further including indicating an operation as failed if the process attempts to perform the operation subsequent the device being logically disconnected from the computing device.

22. (Currently Amended) A method for memory management, comprising:  
tracking a virtual address space for a process associated with a removable memory mappable device connected to a computing device;  
releasing a physical address space when the device has a logical connection removed from the computing device; and

subsequent to ~~after~~ releasing the physical address space and before the process has released the virtual address space, registering that the virtual address space is not available to the process in a manner which does not violate semantics of an operating system.

23. (Currently Amended) A computer readable medium having a program to cause a device to perform a method, comprising:  
dereferencing a virtual address space for a process associated with a removable memory mappable device as part of a memory management system on a computing device;

Application No. 10/790,509  
Amendment dated December 11, 2007  
Reply to Final Office Action of October 31, 2007

releasing a physical address space when the device is logically disconnected from the computing device; and

subsequent to ~~after~~ releasing the physical address space and before the process has released the virtual address space, registering in a virtual memory data structure associated with the process that the virtual address space is no longer available to the process in a manner which does not violate semantics for an operating system the computing device.